

1 What is claimed is:

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3 1. An apparatus for automating an atmospheric pressure  
4 ionization source for a mass spectrometer, wherein said apparatus  
5 comprises:

6 a source tray;

7 a robot;

8 at least one atmospheric pressure ionization (API)

9 source device;

10 a mass analyzer; and

11 a capillary having an inlet end and an outlet end;

12 wherein said inlet end of said capillary is positioned by

13 said robot for accepting ions from at least one of said API

14 source devices, and

15 wherein said outlet end of said capillary is positioned such

16 that said ions are introduced into said mass analyzer.

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18 2. An apparatus according to claim 1, wherein said capillary

19 comprises a channel traversing substantially straight through

20 said capillary.

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22 3. An apparatus according to claim 1, wherein said capillary

23 comprises a channel having a helical structure.

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1 4. An apparatus according to claim 1, wherein said capillary  
2 comprises a channel having a sinusoidal structure.  
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4 5. An apparatus according to claim 1, wherein said inlet end  
5 and said outlet end of said capillary comprise conductive end  
6 caps.  
7

8 6. An apparatus according to claim 1, wherein said outlet end  
9 of said capillary is positioned such that said ions are  
10 transported into a first vacuum region of apparatus.  
11

12 7. An apparatus according to claim 1, wherein said API source  
13 device is selected from the group consisting of electrospray  
14 ionization (ESI) source, matrix-assisted laser desorption/  
15 ionization (MALDI) source and chemical ionization (CI) source.  
16

17 8. An apparatus according to claim 7, wherein said ESI source  
18 is a pneumatically assisted electrosprayer.  
19

20 9. An apparatus according to claim 7, wherein said ESI device  
21 is a microelectrosprayer.  
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23 10. An apparatus according to claim 7, wherein said ESI device  
24 is a nanoelectrosprayer.  
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1 11. An apparatus according to claim 1, wherein said apparatus  
2 comprises at least one ESI source and at least one CI source.  
3

4 12. An apparatus according to claim 1, wherein said mass  
5 analyzer is selected from the group consisting of a time-of-  
6 flight mass analyzer, a quadrupole mass analyzer, a quadrupole  
7 ion trap mass analyzer, and a Fourier transform ion cyclotron  
8 resonance mass analyzer.

9  
10 13. An apparatus for automating an atmospheric pressure  
11 ionization source for a mass spectrometer, wherein said apparatus  
12 comprises:

13 a source tray;

14 a robot;

15 at least one atmospheric pressure ionization (API)

16 source device;

17 a mass analyzer; and

18 a capillary having an inlet end and an outlet end;

19 wherein said API source device is positioned by said robot  
20 such that ions produced therefrom are introduced into said inlet  
21 end of said capillary, and

22 wherein said outlet end of said capillary is positioned such  
23 that said ions are introduced into said mass analyzer.  
24  
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1 14. An apparatus according to claim 13, wherein said capillary  
2 comprises a channel traversing substantially straight through  
3 said capillary.

4  
5 15. An apparatus according to claim 13, wherein said capillary  
6 comprises a channel having a helical structure.

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8 16. An apparatus according to claim 13, wherein said capillary  
9 comprises a channel having a sinusoidal structure.

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11 17. An apparatus according to claim 13, wherein said inlet end  
12 and said outlet end of said capillary comprise conductive end  
13 caps.

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15 18. An apparatus according to claim 13, wherein said outlet end  
16 of said capillary is positioned such that said ions are  
17 transported into a first vacuum region of apparatus.

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19 19. An apparatus according to claim 13, wherein said API source  
20 device is selected from the group consisting of electrospray  
21 ionization (ESI) source, matrix-assisted laser desorption/  
22 ionization (MALDI) source, and chemical ionization (CI) source.

23  
24 20. An apparatus according to claim 19, wherein said ESI source  
25 is a pneumatically assisted electrosprayer.

1 21. An apparatus according to claim 19, wherein said ESI device  
2 is a microelectrosprayer.

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4 22. An apparatus according to claim 19, wherein said ESI device  
5 is a nanoelectrosprayer.

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7 23. An apparatus according to claim 13, wherein said apparatus  
8 comprises at least one ESI source and at least one CI source.

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10 24. An apparatus according to claim 13, wherein said mass  
11 analyzer is selected from the group consisting of a time-of-  
12 flight mass analyzer, a quadrupole mass analyzer, a quadrupole  
13 ion trap mass analyzer, and a Fourier transform ion cyclotron  
14 resonance mass analyzer.

1 25. An apparatus for automating an atmospheric pressure  
2 ionization source for a mass spectrometer, wherein said apparatus  
3 comprises:

4 a source tray;

5 a robot;

6 at least one atmospheric pressure ionization (API)

7 source device;

8 first and second capillary sections each having an

9 inlet end and an outlet end;

10 a union having first and second openings; and

11 a mass analyzer;

12 wherein said outlet end of said first capillary section is  
13 removably positioned within said first opening of said union, and  
14 wherein said inlet of said second capillary section is removably  
15 positioned within said second opening of said union.

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17 26. An apparatus according to claim 25, wherein said first  
18 section comprises a channel having a helical structure.

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20 27. An apparatus according to claim 25, wherein said union  
21 comprises means for removably securing said ends of said first  
22 and second sections.

1 28. An apparatus according to claim 25, wherein said union  
2 comprises means for providing a substantially airtight seal  
3 between said ends of said first and second sections within said  
4 union.

5  
6 29. An apparatus according to claim 25, wherein said inlet ends  
7 and said outlet ends comprise conductive end caps.

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9 30. An apparatus according to claim 25, wherein said ions are  
10 transported from an ionization source into a first vacuum region  
11 of a mass spectrometer.

12  
13 31. An apparatus according to claim 25, wherein said API source  
14 device is selected from the group consisting of electrospray  
15 ionization (ESI) source, matrix-assisted laser desorption/  
16 ionization (MALDI) source and chemical ionization (CI) source.

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18 32. An apparatus according to claim 31, wherein said ESI source  
19 is a pneumatically assisted electrosprayer.

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21 33. An apparatus according to claim 31, wherein said ESI device  
22 is a microelectrosprayer.

23  
24 34. An apparatus according to claim 31, wherein said ESI device  
25 is a nanoelectrosprayer.

1 35. An apparatus according to claim 25, wherein said apparatus  
2 comprises at least one ESI source and at least one CI source.  
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4 36. An apparatus according to claim 25, wherein said mass  
5 analyzer is selected from the group consisting of a time-of-  
6 flight mass analyzer, a quadrupole mass analyzer, a quadrupole  
7 ion trap mass analyzer, and a Fourier transform ion cyclotron  
8 resonance mass analyzer.  
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